

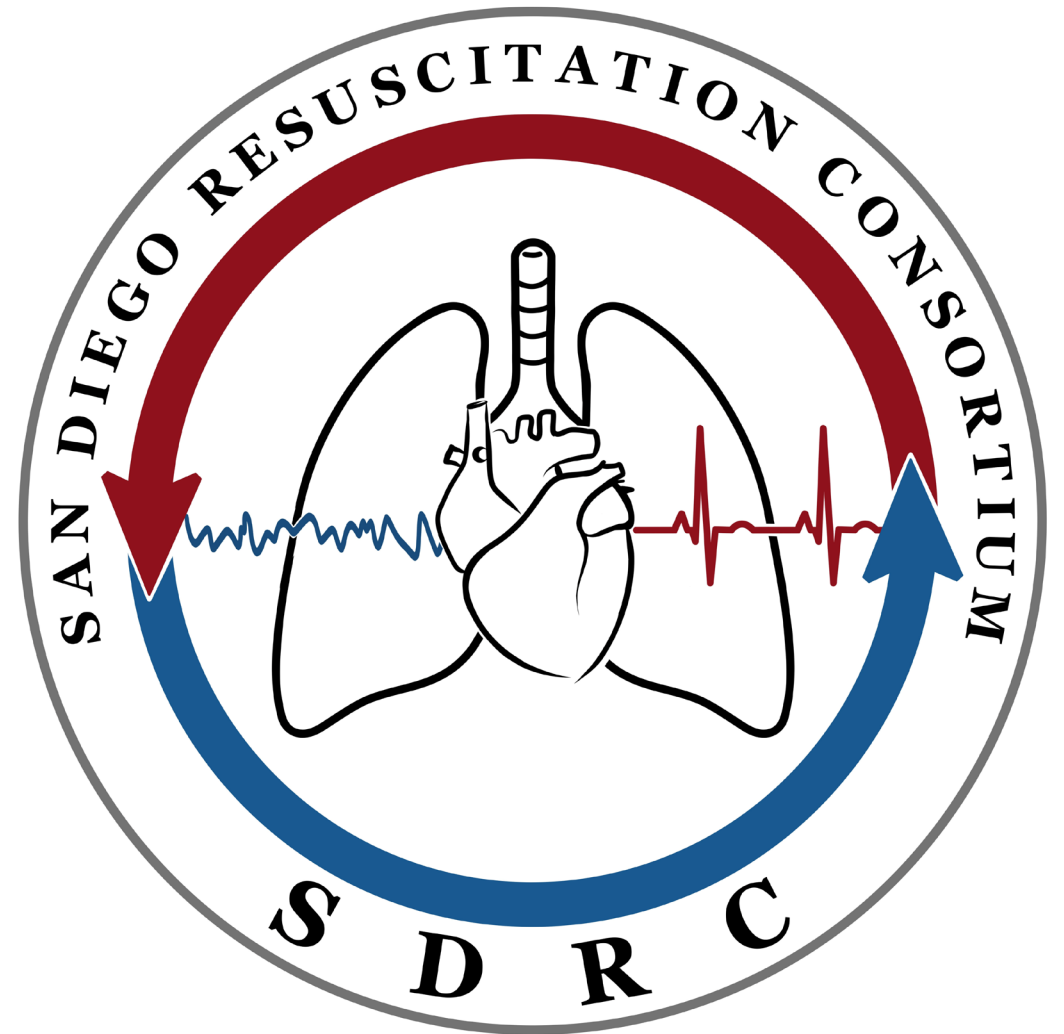
# ECPR & San Diego Resuscitation Consortium

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SAUL LEVINE MD  
SHARP MEMORIAL EMERGENCY DEPT., BASE HOSPITAL MEDICAL DIRECTOR

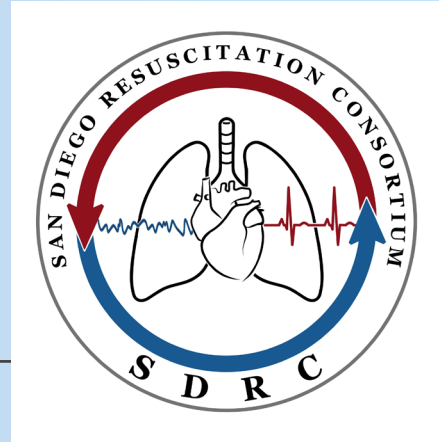
MAY 25, 2023

EMCC



# San Diego Resuscitation Consortium

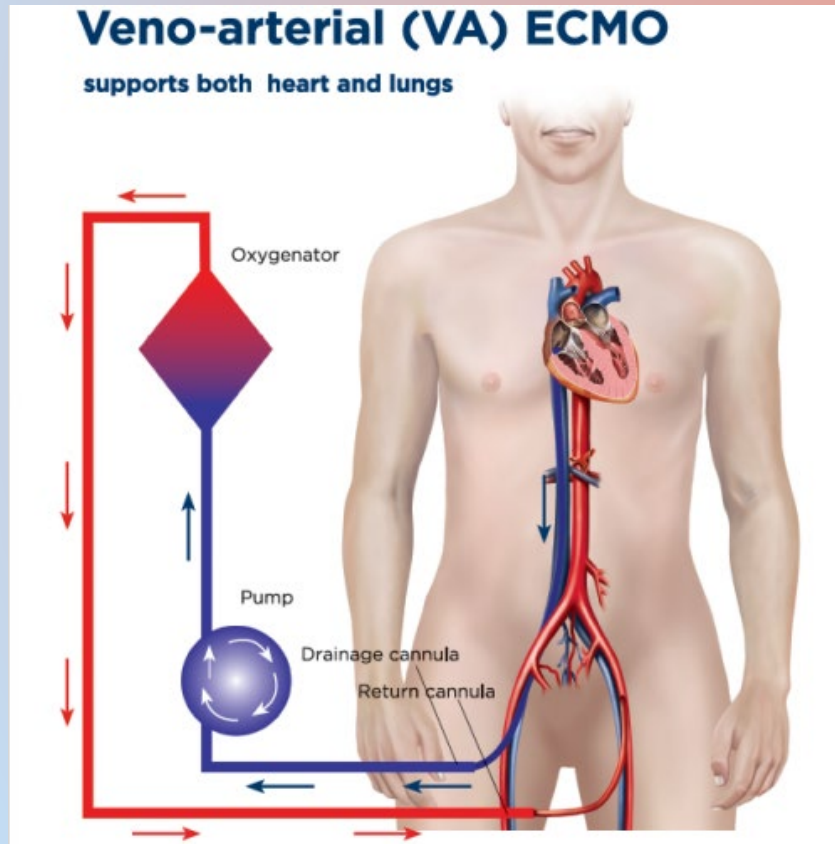
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Goal: Save Lives of Cardiac Arrest Victims by employing a unique, timecritical intervention: ECPR

- Establish protocols for delivering ECPR to selected patients in refractory cardiac arrest
- Work within existing infrastructure to operationalize a process; a BSPC workgroup
- Science & evidence based
- Inclusive
- Transparent

# ECMO (VA) & ECPR

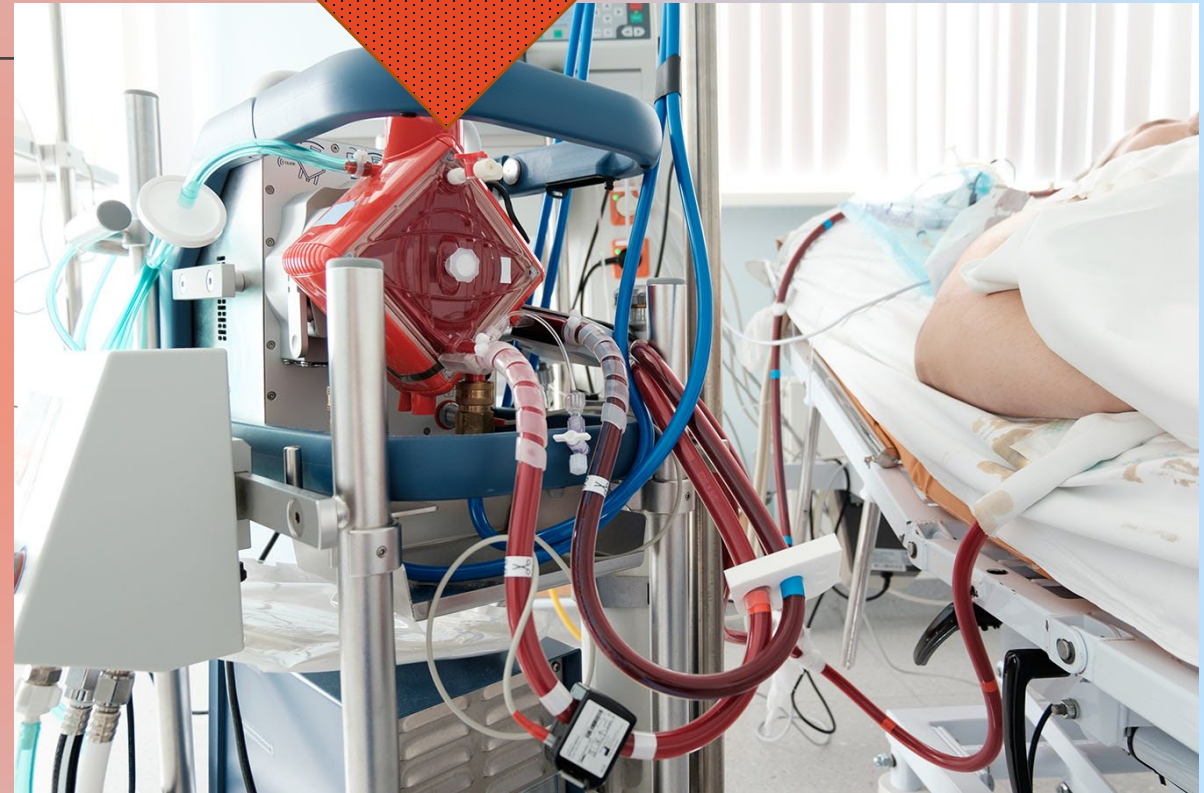
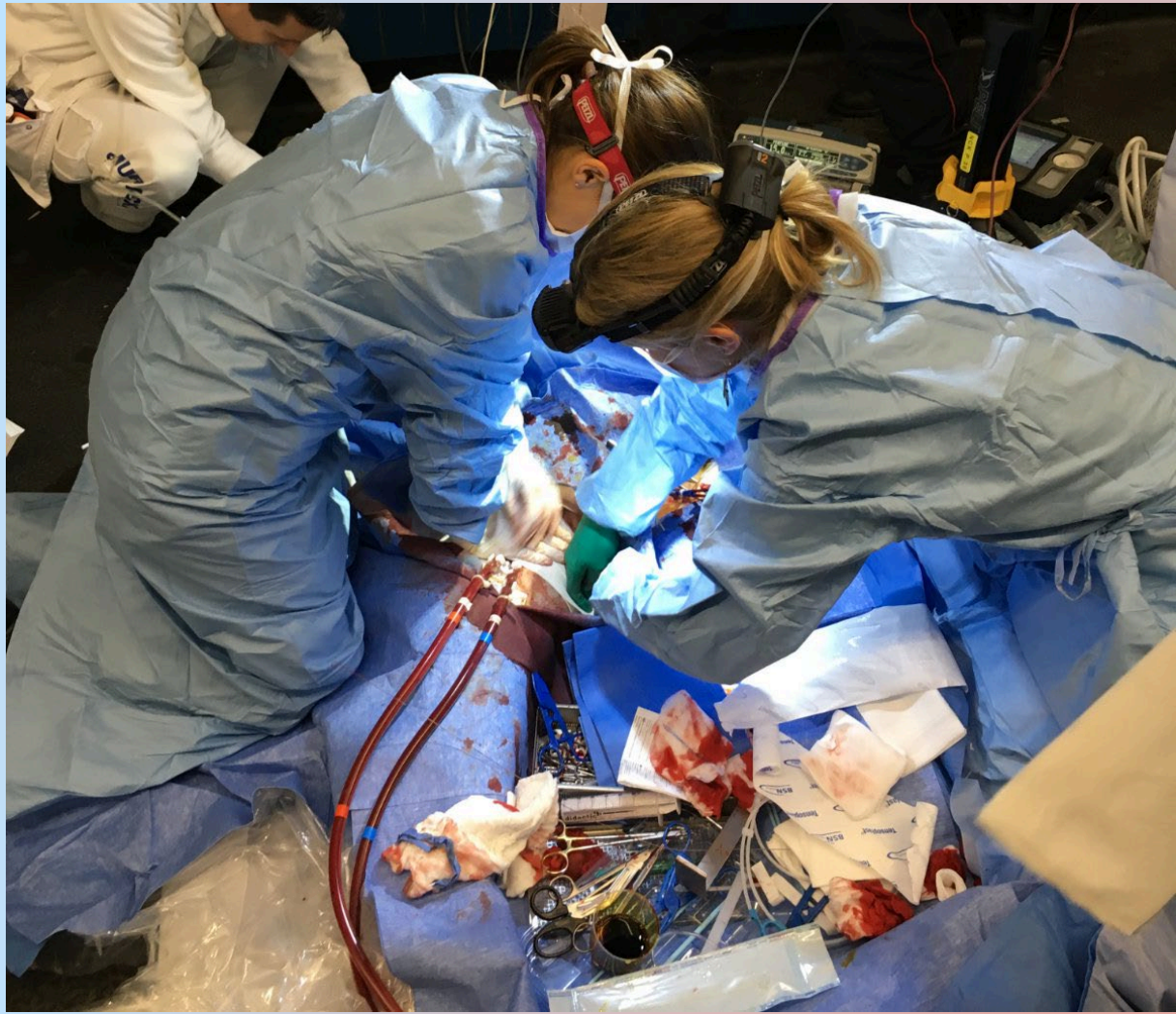


Carry oxygenated blood to the body and brain  
(Heart-Lung Bypass)

Collaborative with EMS, ED, ICU, cardiologists  
and cardiothoracic surgeons

Variety of systems of implementation





# ECPR (ExtraCorporeal CPR)

Recommended by international group (ILCOR)

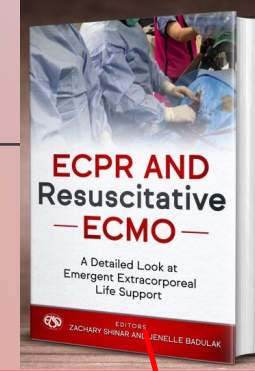
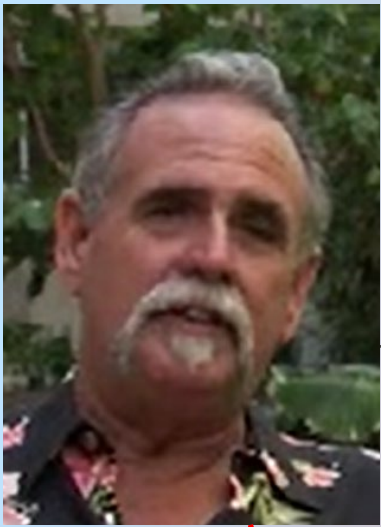
2015 AHA Guidelines to consider in cases of refractory cardiac arrest

2019 Update: “ECPR may be considered for selected patients as rescue therapy when conventional CPR efforts are failing in settings in which it can be expeditiously implemented and supported by skilled providers”





# ECPR history in San Diego



All ED  
docs  
trained  
at GMT

2010

1<sup>st</sup> case  
ECPR  
OHCA in  
SD

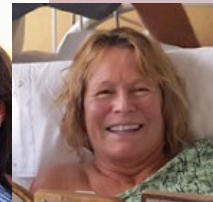
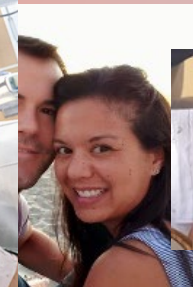
2011

All ED  
docs at  
Sharp  
Memorial  
trained



2017

All ED  
docs  
trained  
at  
Scripps  
La Jolla



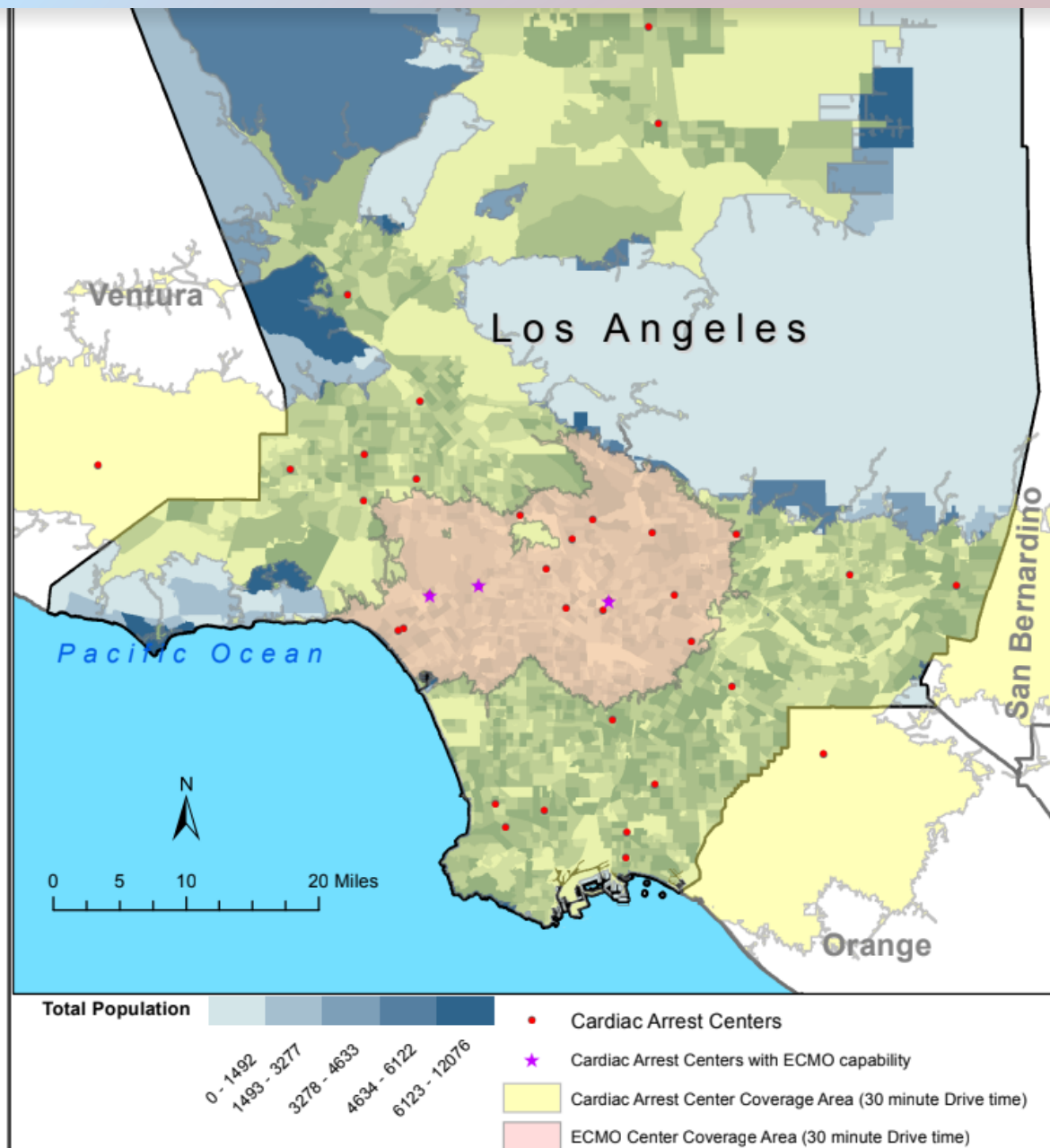
2021

2022

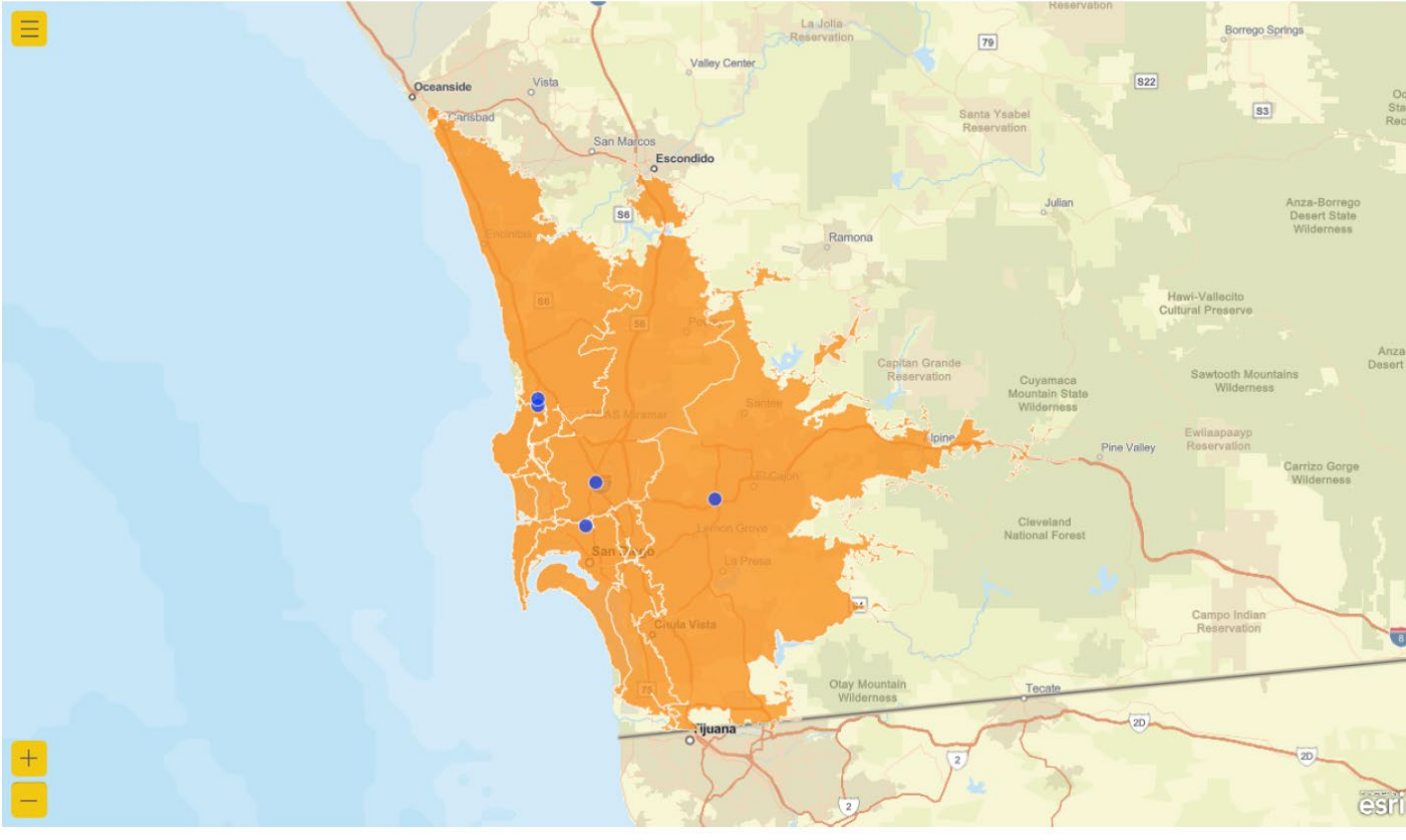






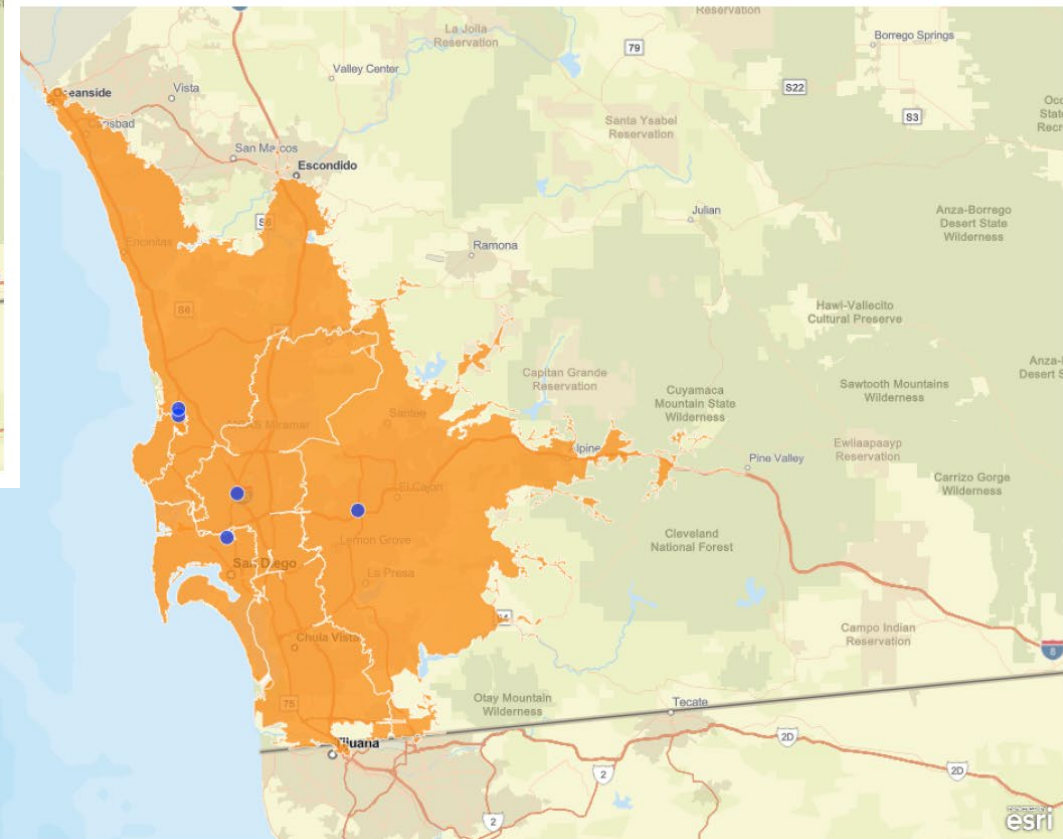






## ECPR Receiving Centers in San Diego County

Tuesdays - 1700



# A New Hospital Designation...

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Significant change in longstanding culture and policy for cardiac arrest

EMS Protocol S 127 – page 6

San Diego County Emergency Medical Services Office  
Policy / Procedure / Protocol

## VENTRICULAR FIBRILLATION / PULSELESS VT

- CPR
- Defibrillate as soon as monitor available/charged
- Defibrillate q2 min while VF/VT persists
- Epinephrine 1:10,000 1 mg IV/IO q3-5 min SO

### **Persistent VF/VT after 3 defibrillation attempts**

- Amiodarone 300 mg IV/IO, MR 150 mg (max 450 mg) SO
- OR**
- Lidocaine 1.5 mg/kg IV/IO SO, MR at 0.5 mg/kg IV/IO q5 min to max 3 mg/kg SO

**Early Base Hospital contact should be considered for persistent or recurrent VF/pulseless VT**



# ECPR Receiving Center Criteria

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- **Facility Requirements** (24/7 cath, ECMO/ECPR activation process)
- **Staffing** (Medical Director & Program Manager, ECMO/ECPR team)
- **Data Management** (Submission to LEMSYS & CARES; data points)
- **Quality Improvement** (Participation required, site-visits)
- **Inclusion and Exclusion Process** (Application)

# Key changes to Protocol S-127

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1. Patients meeting criteria are expeditiously transported off scene to ECPR receiving center after 2 shocks delivered
2. Patients meeting criteria are to be transported to ECPR receiving center even if that means bypassing non-ECPR capable hospital(s)

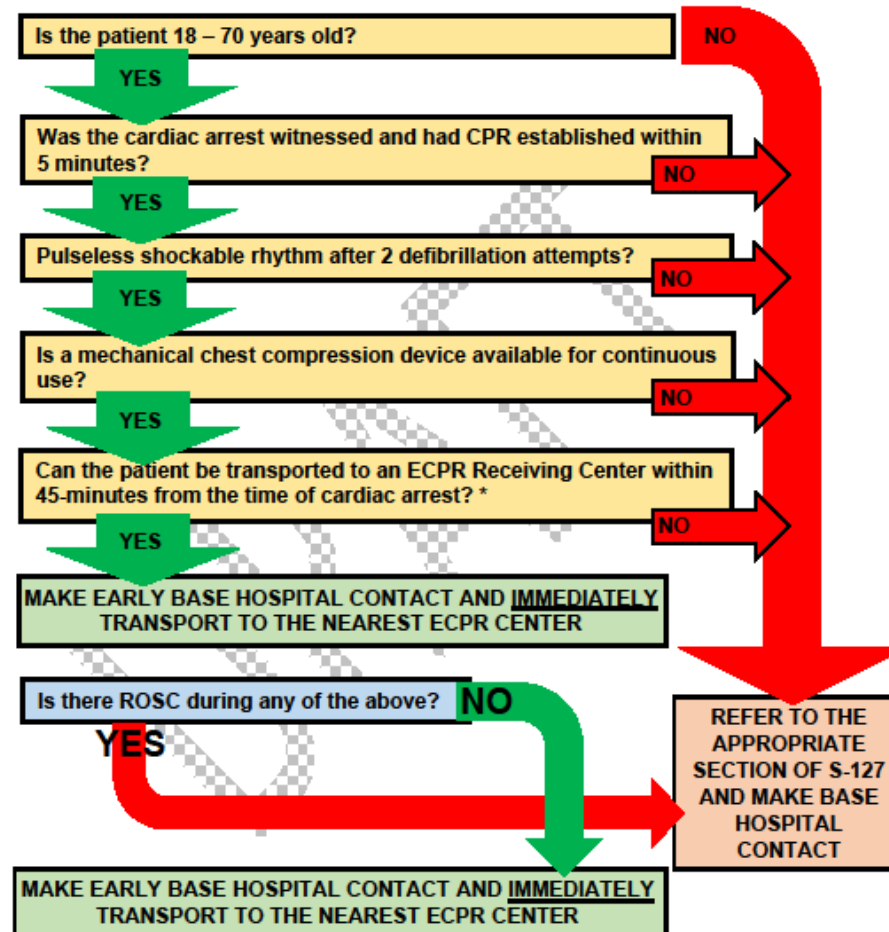


# ECPR in San Diego: Inclusion Criteria

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- 1) Shockable rhythm is identified.
- 2) Witnessed cardiac arrest and CPR within 5 minutes of cardiac arrest
- 3) Estimated arrival in ECPR Center is 45 minutes or less from time of cardiac arrest
- 4) Age 18-70 \*
- 5) Able to provide high-quality chest compressions during transport, with a mechanical compression device

## EXTRACORPOREAL CARDIOPULMONARY RESUSCITATION (ECPR) DECISION ALGORITHM



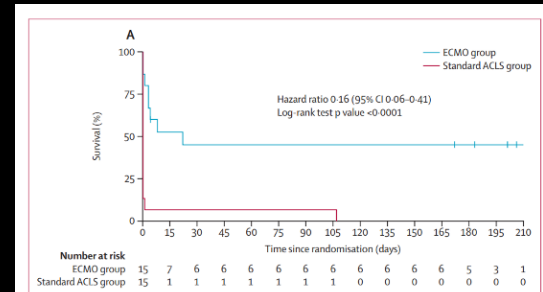
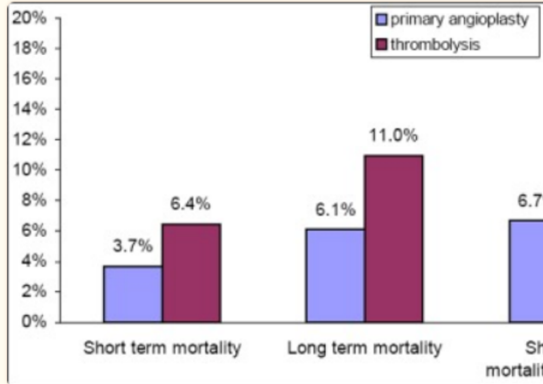
\*May need to bypass non-ECPR designated facilities



# Napkin Math

## Cardiac Cath for STEMI

- 3.2 million people in San Diego
- 50 STEMI's/100,000 = 1664 STEMI's per year in SD
- Assume every STEMI gets emergent cath
- 4.9% improved mortality
- That means per year through our cath programs we save **81 patients**



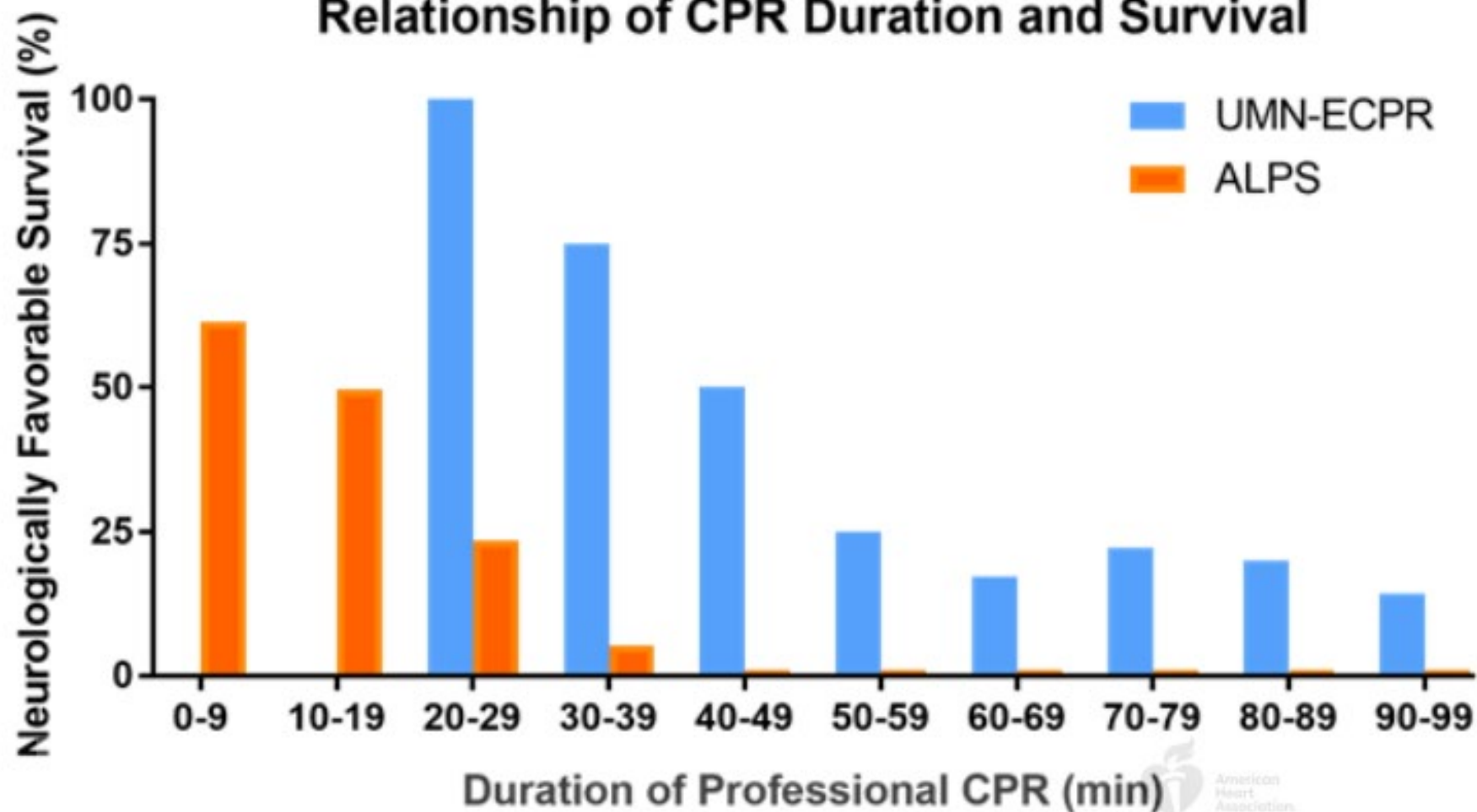
Utstein <sup>1</sup> Survival (%)	N=179 31.8%
Utstein Bystander <sup>2</sup> Survival (%)	N=122 32.8%

## ECPR

- If every Utstein SD arrest got ECPR
- 43% absolute mortality benefit
- 179 patients per year
- We would save through this ECPR

program **77 patients**

## Relationship of CPR Duration and Survival



### Patients at Risk

Time (min)	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	Total
UMN-ECPR	0	0	8	12	20	36	35	27	15	7	160
ALPS	70	151	102	95	99	69	29	11	3	7	636

# Evidence Basis

The ARREST trial:

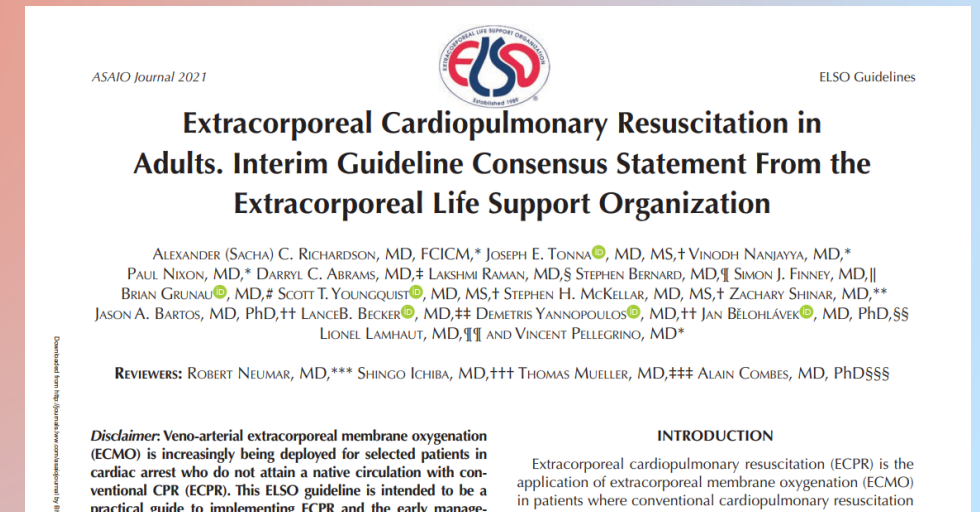
[https://www.thelancet.com/article/S0140-6736\(20\)32338-2/fulltext](https://www.thelancet.com/article/S0140-6736(20)32338-2/fulltext)

The Hyperinvasive Trial <https://www.acc.org/about-acc/press-releases/2021/05/17/04/23/hyperinvasive-care-improves-survival-in-refractory-out-of-hospital-cardiac-arrest>

ECPR and Resuscitative ECMO textbook, 2021:

<https://www.else.org/Publications.aspx>

[www.ELSO.org](http://www.ELSO.org)





# Questions / Comments?

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Saul Levine MD

[sdresuscitationconsortium@gmail.com](mailto:sdresuscitationconsortium@gmail.com)

